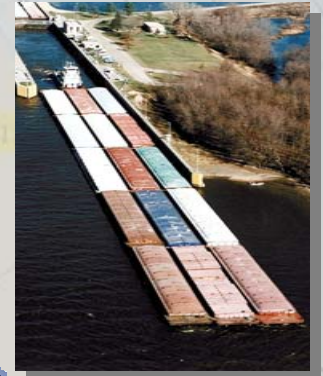
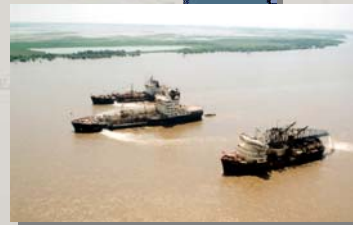
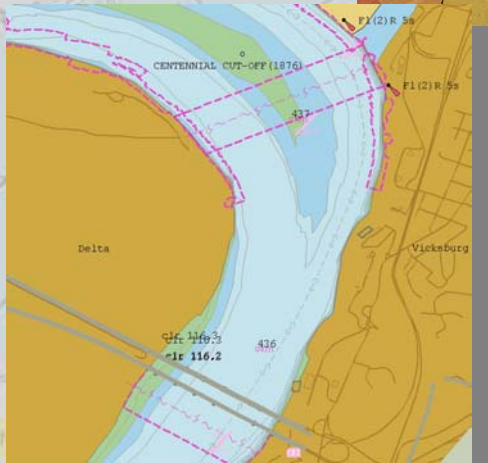
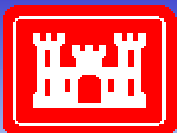


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*Inland Electronic Navigation
Charts Benefiting the Safety
of Navigation*



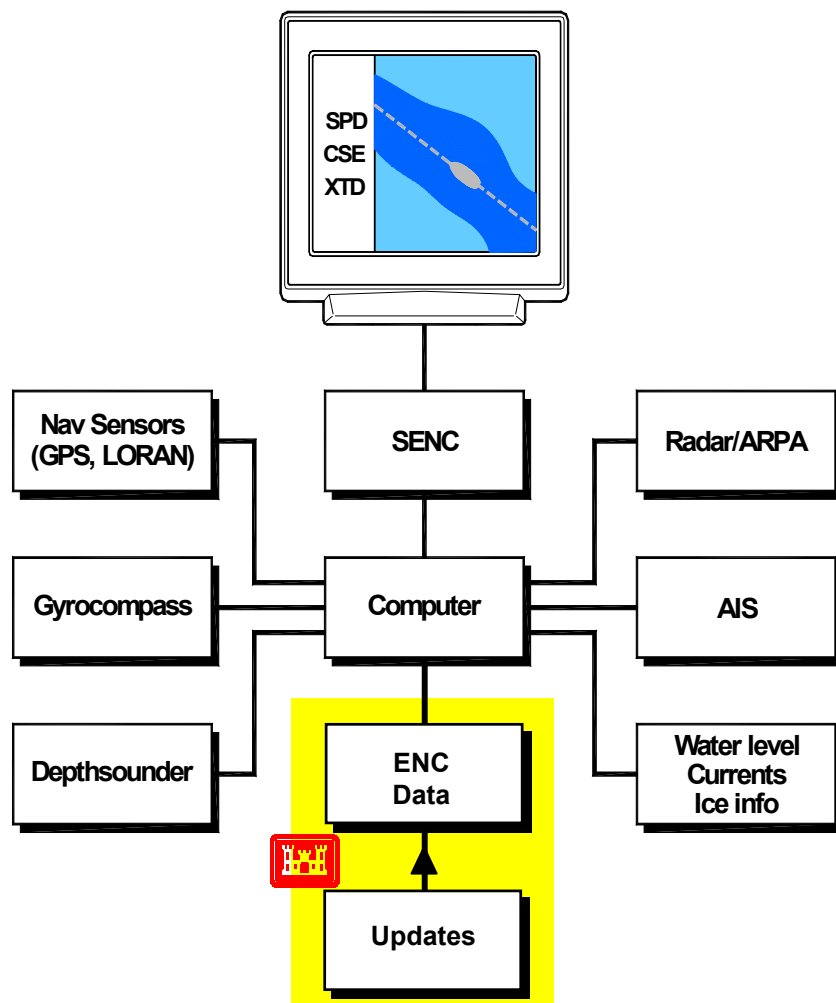


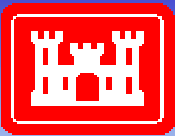
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Electronic Chart System Components

Color Display





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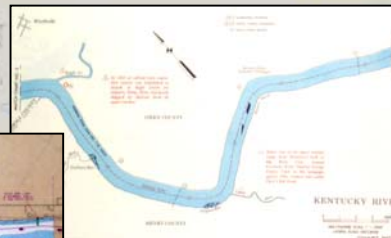
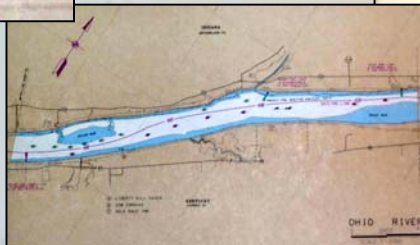
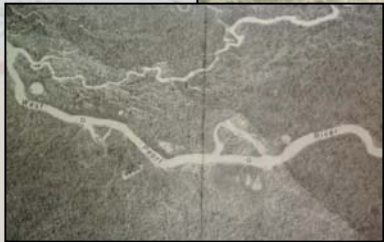
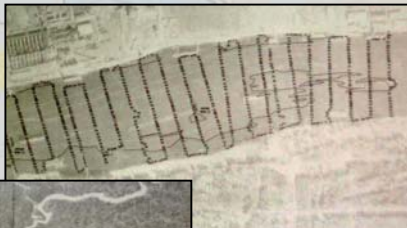
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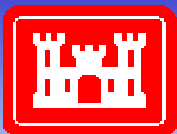
Current Chart Requirement on Western Rivers

33 CFR 164.72: Vessels must carry chart published by NOS, USACE, or river authority.

Current Charts: 22 chart books; sole government chart available

- 2 to 32 years old
- Varying scales, features, accuracies, layout
- No depth data on charts above Baton Rouge





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Objective

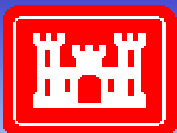
Electronic chart data to be produced and disseminated to other Federal agencies and the public;

- Uniform format and structure suitable for e-chart applications
- Maintained with updates or corrections as new survey or channel condition information is collected
- Based on the S-57 hydrographic data exchange standard
- Closely coordinated with NOAA and Coast Guard
- Available over the internet for free and open access



Inland

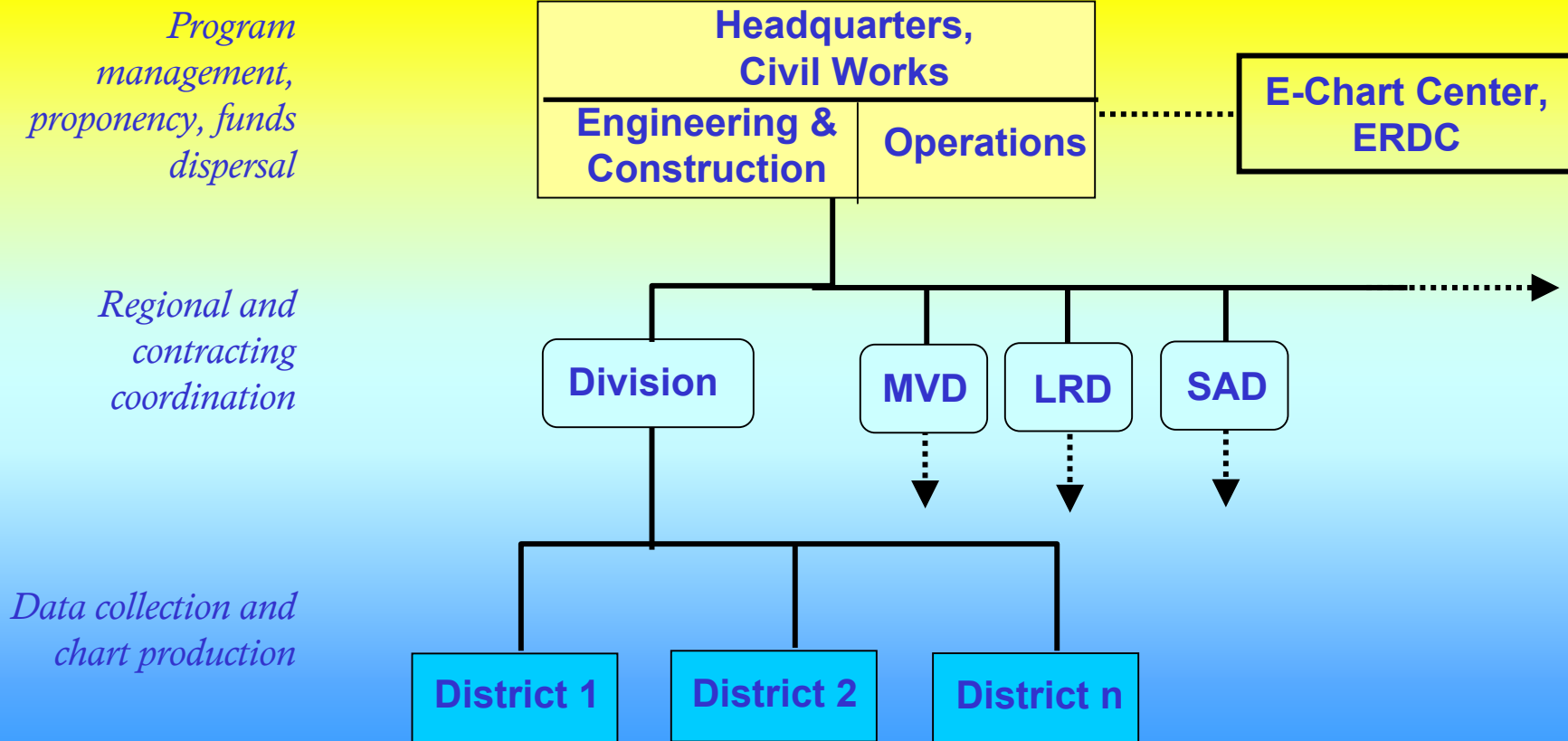
Coastal & Gr Lakes

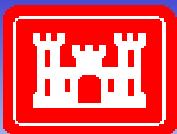


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Corps E-Chart Team

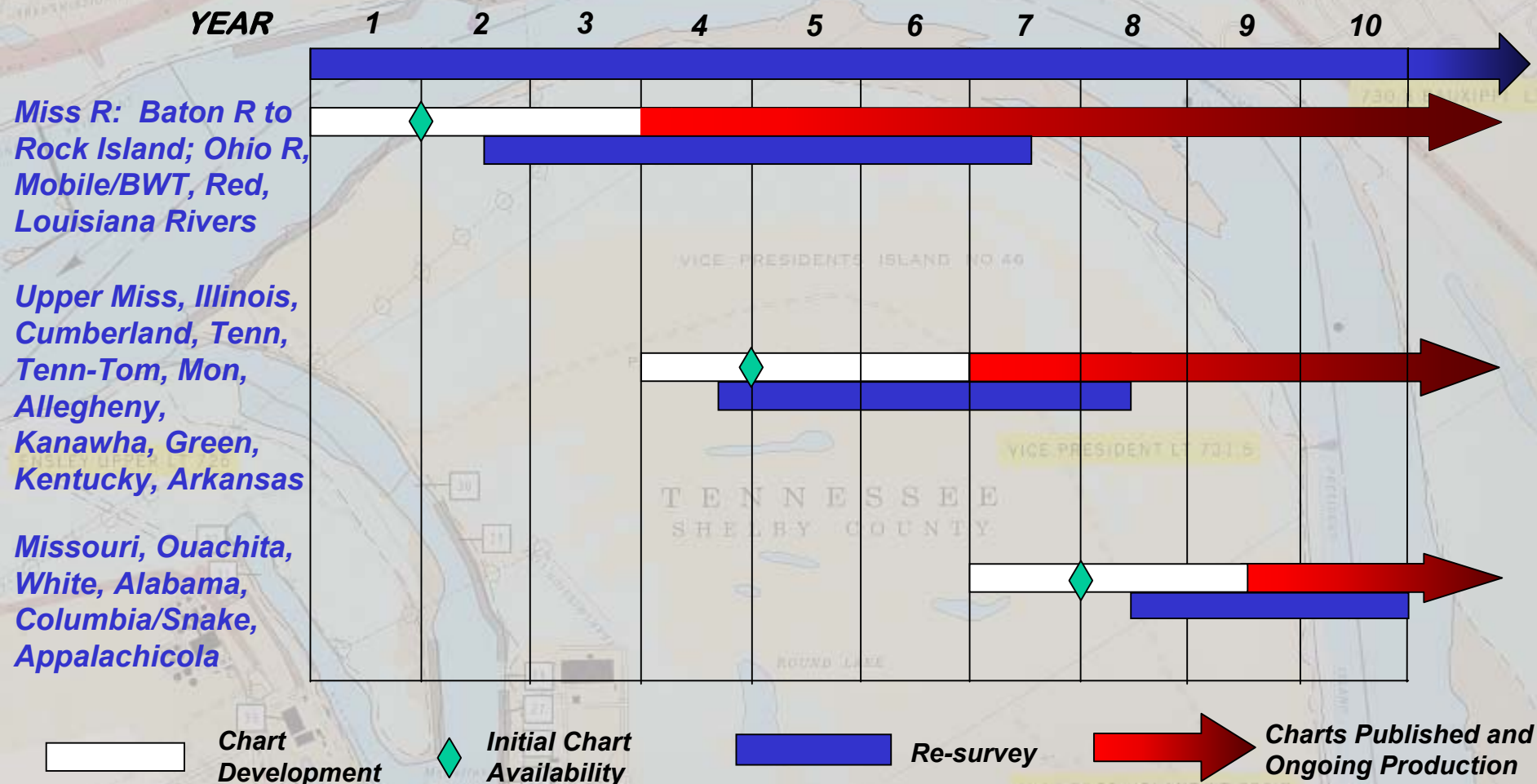


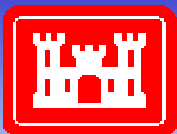


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Ten-Year Implementation Plan





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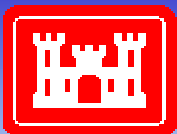
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FY02 Objective

Initial IENC coverage for Lower and Middle Mississippi River, Ohio River, and Mobile River; *charts available to public for evaluation and comment*

Participants:

- New Orleans District
- Louisville District
- Coast Guard
- Vicksburg District
- Huntington District
- NOAA
- Memphis District
- Pittsburgh District
- St. Louis District
- TEC
- Rock Island District
- CADD/GIS Center
- Mobile

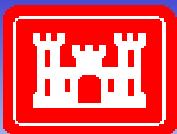


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FY02 Development Approach

1. Data collection from existing Corps district databases; limited re-survey and collection from other sources.
2. Data structuring and conversion to S-57 format by mapping contractors;
 - 3001 Inc – Mississippi and Mobile Rivers, Atchafalaya River update.
 - Photo Science Inc – Ohio River.
3. Development of process with Coast Guard for collection and integration of buoy data.



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IENC Feature, *Buoys*



Red Nun, Green Can, Wreck

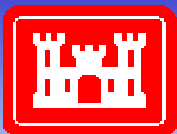
1. Tenders with modified ECS to collect
Buoy information during routine runs

- lat/lon
- buoy type
- river stage

2. Data sent to Corps and entered into floating aids database.

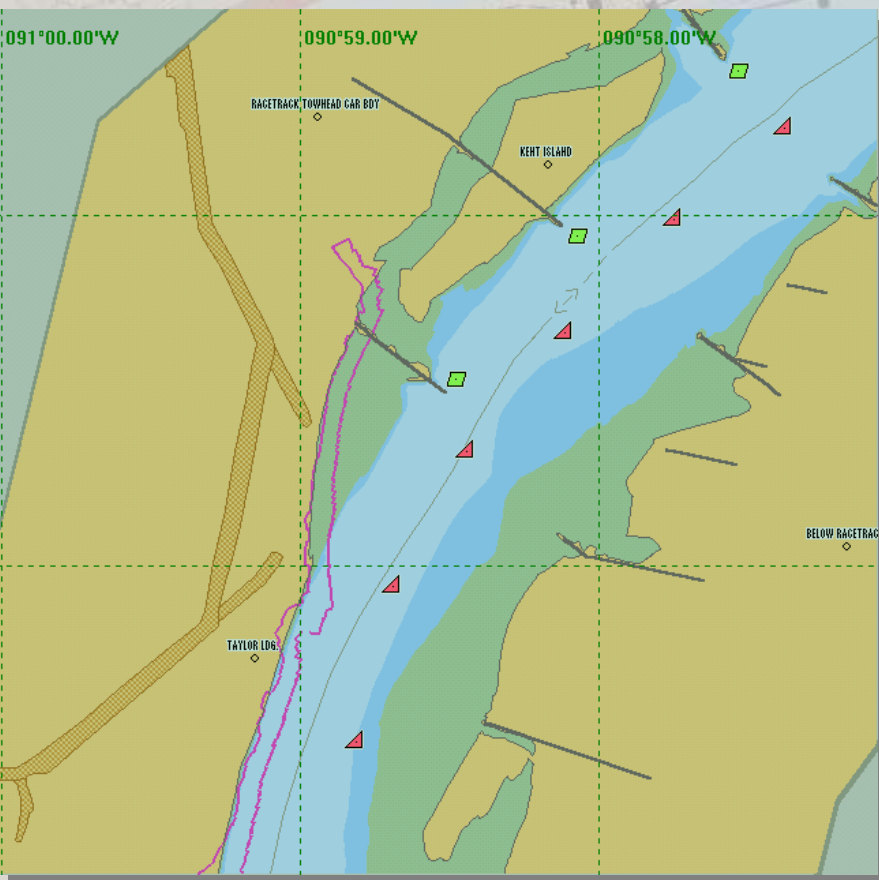
3. Chart Update posted on web.





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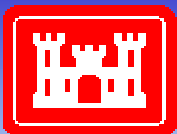
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IENC Feature, *Buoys*

Updated buoys shown in new chart or imported in existing chart to replace old buoys

Reality of Western Rivers: Buoy positions (and existence) can change rapidly; sometimes faster than IENC updates can be provided.



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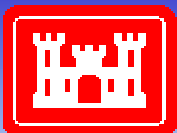
IENC Feature; *Top Bank*

Line denoting flood stage; water at this level begins flowing into land areas, significantly altering river currents and navigation dynamics.

- Approximate line currently shown in open Lower and Middle Miss. chart book (open river)
- Correct representation in IENCs not trivial;
 - line is not continuous nor constant elevation
 - comprehensive bank survey required



Top Bank



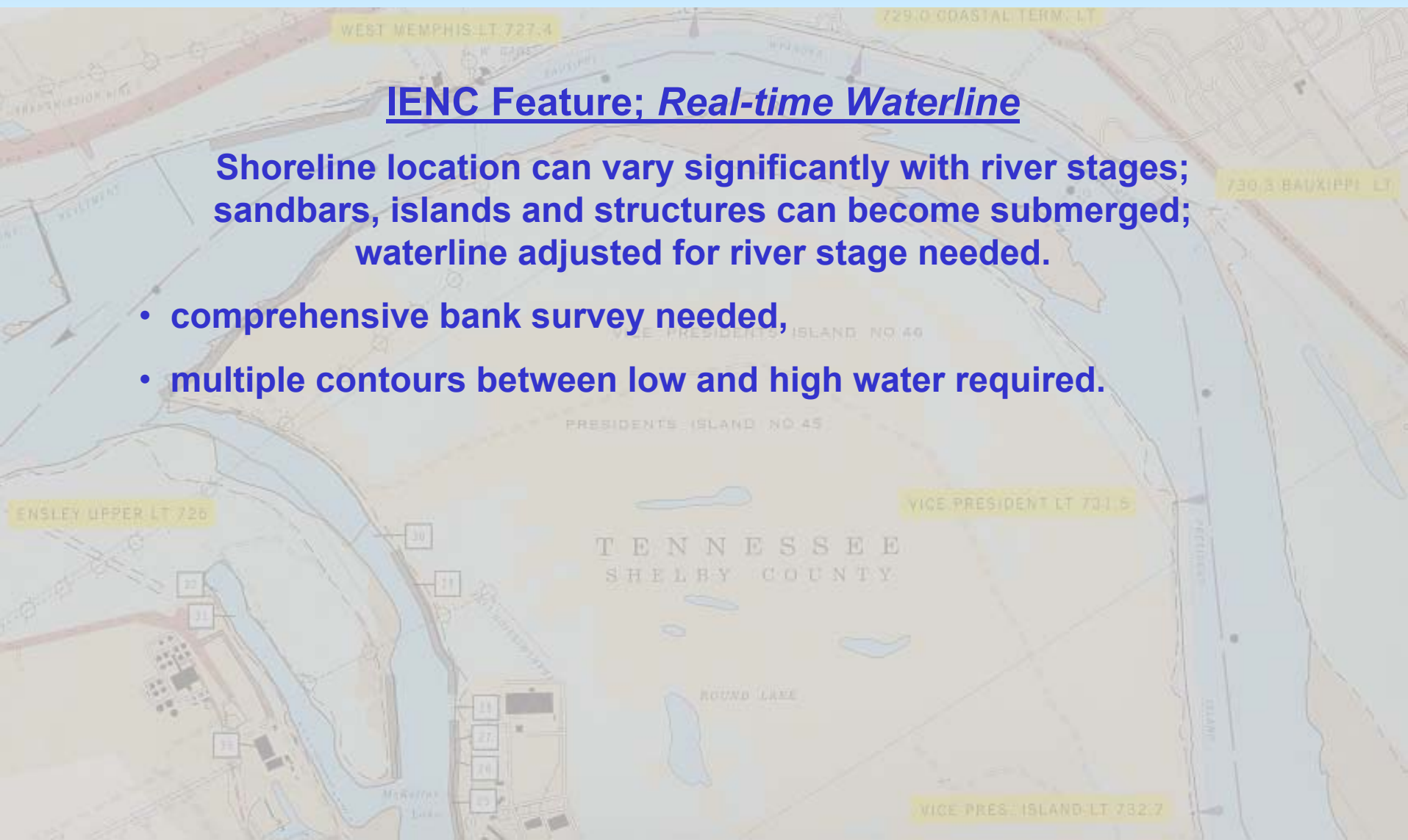
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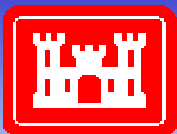
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IENC Feature; *Real-time Waterline*

Shoreline location can vary significantly with river stages;
sandbars, islands and structures can become submerged;
waterline adjusted for river stage needed.

- comprehensive bank survey needed,
- multiple contours between low and high water required.



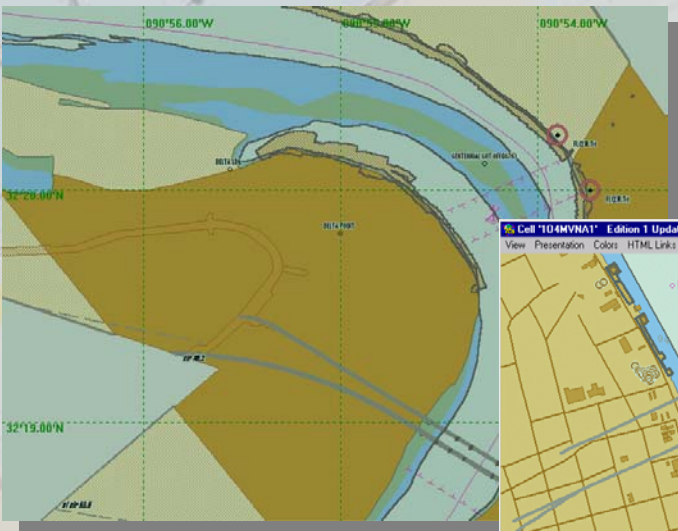


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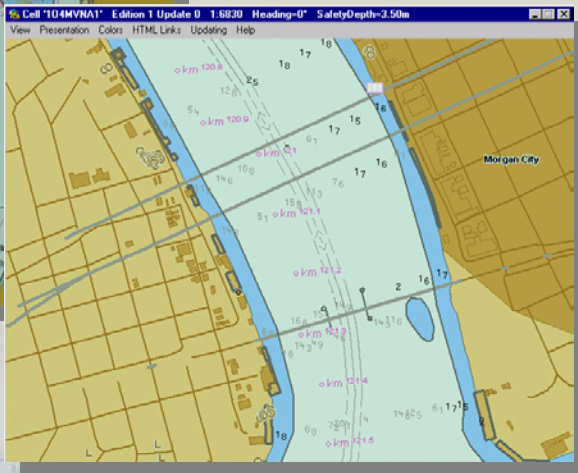
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IENC Content Specification

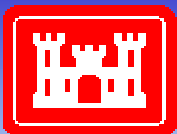
- Defines 56 features with 50 attributes in S-57 structure, *full ENC compliance*.
- Based on industry input and Mississippi and Atchafalaya Pilot projects
- Most features to be included in FY02 development, although may not have sufficient accuracy
- Content Spec available for review



Pilot IENC on Mississippi
River at Vicksburg



Pilot IENC on Atchafalaya River at Morgan City



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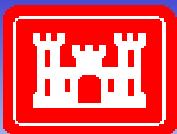
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Possible S-57/ENC Deviations

Features that don't have clear or suitable fit:

- *Sailing Line* – no object for non-centerline, varying orientation
- *Vertical Datums* – LWRP and Project Pool not included
- *Riverbank/Coastline* – “Riverbank” not allowed; eventually, features may not be fixed
- *Fleeting Area* – Category and Restriction attributes don't fit
- *Ice Breaker* – Floating structures that don't have effective attribution

Problem solved by ECS – metric depths, contours and heights, that need to be displayed in English units.



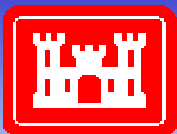
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European Inland ECDIS Standard

Very detailed and specific standard with extensions to the S-57/ENC Standard; includes performance and display requirements.

- Corps to consider use of several components;
 - + consistency of U.S. and European inland charts
 - some features and attributes not applicable to U.S.
- Currently, Corps applying S-57 ENC product specification and testing for suitability.



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Display Standard

- Not included in S-57, and USACE traditionally does not specify what or how charts are to be used;

.....*but*;

- ECDIS and ECS are *systems* in which components and user procedures are not mutually independent;

.....*and*;

- Coast Guard defers to the *hydrographic authority* to define proper chart utilization.

➤ S-52, colors and symbols, to be used during river tests. Corps and Coast Guard to seek input from industry on S-52 suitability.